

Planning Intonational TUNES of Questions in Guanzhong Mandarin

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Introduction: The study focuses on the planning of intonational TUNES in Guanzhong Mandarin (GuanM). Following Gussenhoven [1] and Hayes & Lahiri [2], we assume that intonational TUNES have a phonological as well as a semantic component wherein speakers and listeners share knowledge regarding, for example, the use of a LH TUNE to ask a question in English. This information needs to be stored. The question is how the phonological and semantic information are unpacked in language production. To add to the complexity, we have languages such as Chinese where lexical TONE is contrastive.

We have used the picture-word interference (PWI) paradigm to investigate how the intonational TUNE of questions is stored as an abstract entity and whether lexical TONE (particularly its contour shape) could be a potential source of interference in such process during the picture naming task with auditory distractors. The PWI paradigm is normally used to investigate the time course of word retrieval processes, typically showing an early semantic interference and a late phonological facilitation effect [3]. Our study focused on GuanM, a sub-dialect of Mandarin, which has four lexical tones: T1 (low falling), T2 (rising), T3 (high falling), and T4 (high level). We were particularly interested in falling (T1T1) and rising disyllables (T2T2), since it is argued that it is more difficult to perceive a question TUNE with a rising TONE in Chinese dialects [4]. Would we find similar early semantic inhibition and late phonological facilitation in Chinese?

Experiment design and procedure: Experimental pictures were 18 degraded line drawings, with 9 each from T1T1 and T2T2 disyllabic words. 18 pictures in solid lines were fillers. Auditory distractors, featuring semantic and phonological relatedness were presented with both declarative intonation and interrogative intonation. Stimuli were presented with three different Speech Onset Asynchronies (SOA): -300ms (preceding picture onset), 0ms (simultaneously), and +300ms (after picture onset). Subjects were asked to name pictures in degraded lines using an interrogative intonation and, for pictures in solid lines (fillers), a declarative intonation (Figure 1). They were told to ignore auditory distractors. A total of 60 subjects participated in this study, with 20 subjects in each SOA group. We then used mixed-effect linear models to examine *reaction time* (RT, measured from the onset of the picture display to the response) and *accuracy*.

Result and discussion: For RTs, at SOA -300ms, there were no significant RT differences between semantic and phonological distractors, but at SOA 0ms and SOA 300ms, RTs were significantly shorter for phonological distractors than semantic ones. Importantly, TONE-TUNE interaction was significant at SOA -300ms, RTs were significantly longer when experimental pictures were T1T1 (falling tone), especially with phonological-related distractors with a declarative intonation (Figure 2). No such significant results were observed at SOA 0ms and SOA 300ms. Furthermore, when experimental pictures were T2T2 (rising tone), RTs were significantly shorter with phonological-related distractors across all three SOAs, indicating an interaction between TONE contour shape and TUNE shape from the early stage to the end of the process. In terms of *accuracy*, there was no significant difference in Distractor Intonation, Distractor Type, or Relatedness across three SOAs.

Conclusion: To conclude, our study presents the first study of TUNE planning in tonal languages using the PWI paradigm. Our findings reveal a mid-to-late semantic interference and phonological facilitation with the interaction with TONE. The TUNE is retrieved early and realised later in production. During this process, a general lexical TONE and intonational TUNE interaction is attested.

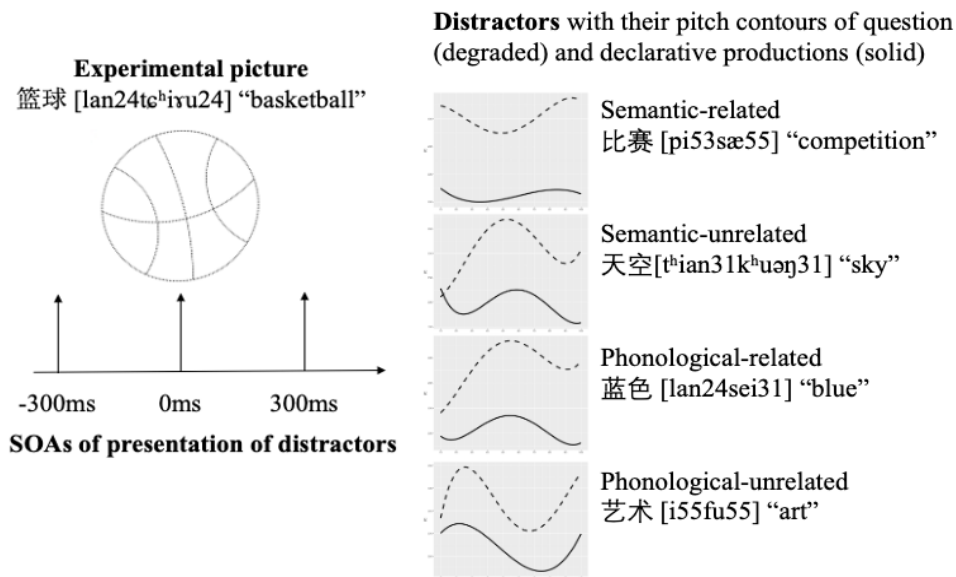


Fig. 1. An example of experimental pictures from T2T2: 篮球 [lan24tɕʰiɻu24] “basketball” with its distractor conditions. All experimental pictures were presented with a degraded line to elicit a question intonation. Distractors were presented at three different SOAs relative to picture onset.

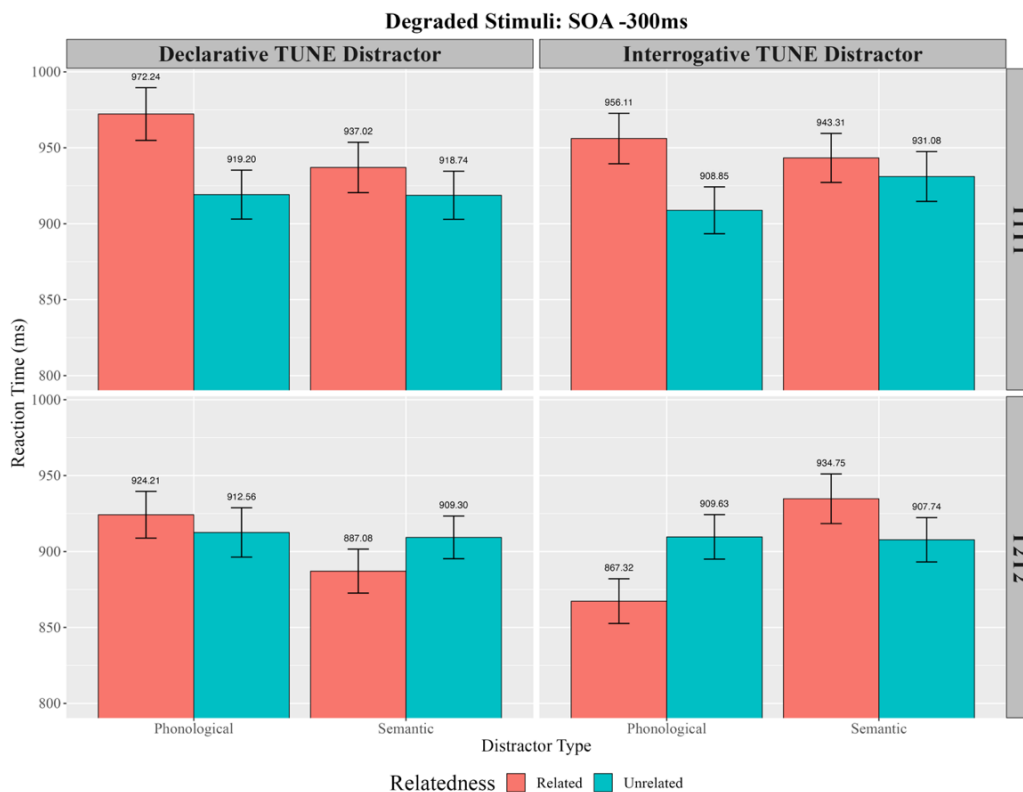


Fig. 2. RTs of experimental pictures at SOA -300ms

References

- [1] Gussenhoven, C. (2004). *The phonology of tone and intonation*. Cambridge University Press.
- [2] Hayes, B., & Lahiri, A. (1991). Bengali intonational phonology. *Natural language & linguistic theory*, 9, 47-96.
- [3] Damian, M. F., & Martin, R. C. (1999). Semantic and phonological codes interact in single word production. *Journal of Experimental Psychology: Learning, memory, and cognition*, 25(2), 345.
- [4] Liu, M., Chen, Y., & Schiller, N. O. (2022). Context matters for tone and intonation processing in Mandarin. *Language and Speech*, 65(1), 52-72.